INSIGHT INTO TESTING AND MANAGEMENT OF THE DEAF-BLIND: A REVIEW

Reg. No. M 9801

Independent Project submitted as part of fulfillment for the first year M.Sc, (Speech and Hearing) to the University of Mysore.

ALL INDIA INSTITUTE OF SPEECH AND HEARING
Mysore - 570006
1999

DEDICATED

TO

AMMA. DADA. KAVI. DEVI. AMMU
WITH LOVE

CERTIFICATE

This is to certify that this Independent Project entitled ***INSIGHT INTO TESTING AND MANAGEMENT OF THE DEAF-BUND: A REVIEW*** *is* the bonafide work in part fulfillment for the degree of Master of Science (Speech and Hearing) of the student with Register No. M 9801.

Mysore

May, 1999

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CERTIFICATE

This is to certify that this Independent Project entitled *INSIGHT INTO* ***TESTING AND MANAGEMENT OF THE DEAF-BLIND: A*** *REVIEW* has been prepared under my supervision and guidance.

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May, 1999

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DECLARATION

This Independent Project entitled **INSIGHT INTO TESTING AND MANAGEMENT OF THE DEAF-BLIND: A REVIEW** is the result of my own study under the guidance of **DR. ASHA YATHIRAJ,** Reader in Audiology, Department of Audiology, All India Institute of Speech and Hearing, Mysore and has not been submitted earlier at any University for any other diploma or degree.

Mysore

May, 1999 ***Reg. No. M 9801***

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INTRODUCTION

"Thou shall not curse the deaf

nor put a stumbling block before the blind....."

LEVITICUS 19:14

Deafness engenders the most conflicting emotions and leaves the person affected in the most baffling situation. The handicap of deafness is unique since deafness as such is invisible.

Human beings mainly communicate through speech. Children learn speech and language by hearing others speak. The hearing impaired children, however, do not learn to speak the language spoken around by others, as they are unable to hear others speech. Nevertheless, many hearing impaired children develop speech and other language skills, though the children who are deaf or who have severe impaired hearing do not learn the language in the same way or at the same rate. On account of this, the term deaf-mute has fallen into disrepute and obsolute as the implication is that deaf is unable to speak (Sen, 1988).

From infancy the hearing impaired child is denied all normal means of communication. As he cannot hear, he cannot speak and because of lack of speech and language, he cannot learn. Speech and language is very essential for normal living. Language is to be acquired by all for making friends, enhancing ideas, carrying on day-to-day life transactions (Sen, 1988).

Eyes are one of the nature's greatest gifts to mankind. Generally speaking the term 'blind' means persons who have totally lost their sight or whose vision is of no practical value to them for the purpose of education or in the general business of living (Mehta, 1983).

It is mainly through the visual modality, that human beings receive accurate and gestalt impressions of the environment assisting in orienting them towards the environment. The twin process of adaptation and accommodation have joined in helping in the vast development of the sense of vision through its extensive usage (Sen, 1988).

Loss of vision induces a variety of adjustment and personality problems. Blindness in an individual exerts a profound effect on his psyche (Baker 1959). The significant role of vision becomes evident

from the fact that man, both physically and psychologically, is the product of continuous interaction with his environment and vision plays a vital role in this interaction (Sen, 1988).

Blindness is a situational variable or a complex of situational variables. The blind person cannot acquire information by interpreting visual stimuli, which is the richest source of information about the world in which the individual lives. Onset of blindness brings in its wake a large number of problems which may affect the personality of the individual. Carroll (1961) has enumerated the losses brought about by blindness which include loss of physical integrity, loss of confidence in remaining senses, loss of visual background, loss of mobility, loss of techniques of daily living, loss of ease written communication, loss of informal progress, loss of visual perception, loss of vocational goal, loss of job opportunity, loss of financial security, loss of social adequacy and problems of organization of personality amongst others.

When double disabilities occur, the compounding may bring unexpected consequences. In case of the double disability of deafness and blindness the two primary sensory inputs are lacking. This leads to severe education and communication problems. The deaf child learns much through imitation. The blind child is

educated primary through verbal communication from others. The deaf-blind child lives in a world of vibrations, air currents, temperature changes, smell9 and a great many tactile sensations and sensations from within the digestive system, muscles joints etc, (Goldenson, 1978).

For the congenitally deaf it is difficult to understand language and for the congenitally blind it is not simple to master the physical and social environment. The combination of the two defects leaves the child physically and socially isolated from the environment.

The deaf-blind are not usually entirely deaf or entirely blind. The usual definition of deaf-blindness is that the person has an auditory and visual impairment which makes it difficult for him to communicate or be educated in the usual fashion. Second, the person who is born blind and becomes deaf later in life has a different set of problems from one who is born deaf and becomes blind later.

Communication is a primary problem with deaf-blind children and adults. The next greatest problem is mobility. The obvious problems of not seeing and hearing cues in the environment are

made more difficult by problems of balance and difficulty in walking in a straight line (Goldenson, 1978).

The deaf-blind child has been defined by the Bureau of Education for the Handicapped (1969) as: A child who has both auditory and visual impairments, the combination of which causes such a severe communication and other developmental and educational problems that he cannot properly be accommodated in special education programs either for the hearing handicapped or for the visually handicapped child (Scheetz, 1993).

AIM OF THE PROJECT: This project aims at reviewing various aspects regarding the deaf-blind. It includes information with reference to:

- The incidence and prevalence of the deaf and blind in India
- The various audiological testing procedures and their implications for the deaf-blind.
- The major rehabilitation avenues available for the deaf-blind in India
- The communication methods/strategies that are used by the deaf-blind.
- The prevocational training for the deaf-blind.

- Selection of hearing aids for the deaf blind.

It also aims to highlight the facilities, concessions and welfare measures that are provided for the deaf-blind in India.

N**EED FOR THE PROJECT:** A news letter published by "Sense International India,(1988) reports that community based projects indicate that there are approximately 2,50,000 individuals with dual sensory/multisensory problems in India. These would include the deaf-blind. This statistical evidence emphasises the need to report the testing, and rehabilitation procedures for the deaf-blind individuals.

There is a need to review the literature to see if the testing and rehabilitation procedures for a deaf blind individual would differ from that a sighted person with a hearing impairment.

Though most audiologists are well versed in handling a hearing impaired individual, very few of them can effectively deal with a deaf blind individual. This project aims at imparting this knowledge to an inexperienced audiologist.

The project will be useful also to other rehabilitators working with the deaf blind.

Hence from the above, it is evident that there is a need for this project.

INCIDENCE AND PREVALENCE
OF DEAFNESS AND BLINDNESS

PREVALENCE AND INCIDENCE OF DEAFNESS IN INDIA:

The 1931 census carried out in India showed that there were 1,37,680 males and 93,215 females who were deaf and that about 66 per 1,00,000 of the general population were deaf (Sen, 1988).

According to Udayshankar (1976), there would be about 1,25,000 totally deaf children and about 13,75,000 partially deaf, either in one ear or in both the ears. Sen (1988) has reported of surveys in the cities like Bombay, which indicated that about 3 out of every 1000 persons would be deaf, thus more than ten crores of people were suspected to be deaf.

The 36th round of the National Sample Survey (1981) indicated:

I. a) The prevalence rate of hearing disability was approximately 595 and 510 per 1,00,000 population in the rural sector for males and females respectively. (Table 1).

b) Similarly the prevalence rate of hearing disability was approximately 386 and 395 per 1,00,000 in the urban sectors for males and females respectively. (Table 1).

c) The prevalence rate for both males and females on an average was found to be 573 per 1,00,000 in the rural areas and 390 per 1,00,000 in the urban areas.

II. a) The incidence rate of hearing disability was found to be 20 and 18 per 1,00,000 population in the rural sector for males and females respectively. (Table 1).

b) Similarly the incidence rate of hearing disability was found to be 14 and 15 per 1,00,000 in the urban sector for males and females respectively. (Table 1).

c) The incidence rate for both males and females on an average was found to be 19 and 15 per 1,00,000 in the rural and urban sectors respectively. (Table 1).

The National Sample Survey (1991) indicated:

I. a) The prevalence rate of hearing disability was approximately 498 and 435 per 1,00,000 population in the rural sector for males and females respectively.

b) Similarly the prevalence rate of hearing disability was approximately 325 and 355 per 1,00,000 urban sector for males and females respectively.

c) The prevalence rate for both males and females on an average was found to be 467 and 339 per 1,00,000 in the rural and urban sectors respectively.

It is seen from the above information, that the prevalence rate of hearing disability in the rural areas is higher than that of the urban areas. This has been reported in the earlier census also.

II. a) The incidence rate of hearing disability was found to be 16 and 14 per 1,00,000 population in the rural sector for males and females respectively.

b) Similarly the incidence rate of hearing disability was found to be 11 and 14 per 1,00,000 in the urban sector for males and females respectively.

c) The incidence rate for both males and females on an average was found to be 15 and 12 per 1,00,000 in the rural and urban sectors respectively. (Table 1)

TABLE 1: Incidence and Prevalence of Hearing Impairment as per the National Sample Survey conducted in 1981 and 1991.

Hearing Disability						
		NSS 1981			**NSS 1991**	
Sector	Male	Female	Persons	Male	Female	Persons
Prevalence Rate						
Rural	595	510	573	498	435	467
Urban	386	395	390	325	355	339
Incidence Rate						
Rural	20	18	19	16	14	15
Urban	14	15	15	11	14	12

NOTE : Prevalence and Incidence rate are given per 1,00,000

PREVALENCE AND INCIDENCE OF BLINDNESS IN INDIA:

Legal Blindness and Uncorrected Visual Problems:

1. The blind and
2. The partially sighted or individuals with low vision (Krik and Gallagher 1979).

- A legal-medical definition of blindness can be found in the Fact Book prepared by the National Society of the prevention of Blindness (1966). The definition for blindness is as follows:

- Visual acuity for distance vision of 20/200 or less in the better eye.

- With acuity of more than 20/200 if the widest diameter of filed of vision subtends an angle no greater than 20 degrees.

The partially sighted are defined as:

- Persons with a visual acuity greater than 20/200.
- But not greater than 20/70 in the better eye with correction (Scheetz '1993).

Out of the total estimated 30 million blind persons (Visual Acuity lesser 3/60) in the world, 6 million are in India. Thus, one out of every 5 blind persons in the world is an Indian. A few surveys were conducted to find out prevalence of blindness in the country. The first survey was done by the Indian Council for Medical Research (ICMR) on a National Sample in 1974 and arrived at a figure of 1.38 percent prevalence rate for the economically blind. In the second survey by National Programme for Control of Blindness / World Health Organization (NPCB/WHO) (1986-89), the prevalence rate increased to 1.49 percent . The increases could be due to changes in age structure and could also be due to mounting backlog. According to a report on present status of National Programme for Control of Blindness (NPCB 1993).

The 36th round of the country-wide survey of the National Sample Survey Organization (NSSO) conducted in 1981 estimated the visual disability they are:

I. a) The prevalence rate of visual disability was approximately 444 and 670 per 1,00,000 population in the rural sector for males and females respectively. (Table 2).

b) Similarly the prevalence rate of visual disability was approximately 294 per 1,00,000 males and 425 per 1,00,000 females in urban sector. (Table 2).

c) The prevalence rate for both males and females on an average was found to be 553 per 1,00,000 in the rural and 356 per 1,00,000 in the urban sectors.(Table 2).

II. a) The incidence rate of visual disability was found to be 32 per 1,00,000 males and 45 per 100000 females in the rural sectors. (Table 2).

b) Incidence rate of visual disability was found to be 23 and 38 per 100,000 in the urban sector for males and females respectively. (Table 2).

c) The incidence rate for both males and females on an average was found to be 38 and 30 per 1,00,000 in the rural and urban sectors respectively. (Table 2)

The National Sample Survey (1991) indicated that the prevalence for visual disability in males and females on an average was found to be 525 per 100,000 persons in the rural population and

302 per 100,000 persons in the urban population. The incidence was found to be 25 per 100,000 in rural population and 20 per 100,000 persons in urban population.

The National Sample Survey Organization has found that the prevalence of hearing disability and visual disability in 1991 has marginally gone up as compared to 1981 with the same definition and same survey methodology. In 1991, the prevalence in rural areas was 1.99 percent as against 1.84 percent in 1981. The prevalence in urban areas in 1991 was 1.58 percent as against 1.42 percent in 1981.

(Pandey and Advani '95)

TABLE 2: A comparison of the estimate of individuals with blindness as per the 1981 and 1991 NSS.

Visual Disability						
	1981			**1991**		
Sector	Male	Female	Persons	Male	Female	Persons
Prevalence Rate						
Rural	444	670	553	471	548	525
Urban	294	425	356	263	346	302
Incidence Rate						
Rural	32	45	38	22	28	25
Urban	23	38	30	15	25	20

INCIDENCE OF DEAF-BLINDNESS:

Not much research to assess the extend of deaf-blindness in the country has been carried out. Sense International - India (1988) have reported of community based projects which indicate that there are approximately 2,50,000 persons with dual problems/multisensory problems in India. These would included the deaf-blind.

From the research on the incidence and prevalence of hearing impairment and blindness it can be noted as to how enormous these disorders are. From these figures the professionals working for the deaf and the blind get an idea about the manpower resources and the facilities that should be provided for these individuals.

AUDIOLOGICAL ASSESSMENT

OF A DEAF-BLIND CHILD

Deaf-blind children represent a unique population and as such often present difficulties in assessment of auditory functioning. An accurate diagnosis of hearing ability is necessary in order to plan effectively and to insure that residual hearing is being utilized to the maximum (Kent, 1981).

Hearing assessment begins with the first contact between the audiologist and the child. The most important aspect of the evaluation, perhaps is establishing a comfortable relationship with the child and allowing him to become accustomed to the situation before any formal assessment is attempted, for this will often influence all test procedures and results to follow. A good rapport is necessary in hearing assessment with any population. It becomes essential with the deaf-blind child, if any reliable information is to be obtained.

A deaf-blind child should not be expected to enter the test situation and respond appropriately to a conditioning exercise without some degree of training (Kent, 1981).

TESTING PROCEDURES:

A deaf-blind child can be evaluated for his/her hearing ability either by behavioral procedures or objective tests.

Behavioral Tests:

Behavioral procedures may have to be modified to be used to evaluate the deaf-blind. Most often the behavioral test utilized with hearing impaired who have vision may be used with deaf-blind individual with modifications. However, certain tests which mainly make use of visual stimuli (Visual Reinforcement Audiometry) may not be useful for testing these children. The behavioral tests that are used to evaluate the deaf blind may be classified as:

(i) Unconditioned Response Test

(ii) Conditioned Response Test

(i) **Unconditioned Response Test**

To assess the behavioral responses of a deaf-blind child to auditory signals, it is essential to know how a normal hearing child would response to auditory signals.

Table 3 gives the auditory development seen in normal hearing children at various ages (Northern and Downs, 1991). This can be utilized to note any deviation from the normal response.

TABLE 3: Auditory Behavior of Normal Hearing Infants

AGE	RESPONSE
Newborn period to 4 months:	Normal infant is aroused from sleep by sound signals of 90dB (SPL) in a noisy environment, 50-70 dB(SPL) in quiet.
3 to 4 months:	Normal infant begins to make a rudimentary head-turn toward a sound signal 50-60dB (SPL).
4 to 7 months:	Baby turns head directly toward the side of a signal 40-50dB (SPL) but cannot contact find it above or below.
7 to 9 months:	Baby directly locates a sound source of 30-40 dB (SPL) to the side and indirectly below.
9 to 13 months:	Baby directly locates a sound source of 25-35 dB (SPL) to the side and below.
13 to 16 months:	Toddler localizes directly sound signals of 25-30 dB (SPL) to the side and below; indirectly above.
16 to 21 months:	Toddler localizes directly sound signals of 25-30 dB (SPL) on the side, below and above.
21 to 24 months:	Child locates directly a sound signal of 25 dB (SPL) at all angles.

Northern and Downs, (1991).

In behavioral observation audiornetry used with children with vision, stimuli are presented in soundfield through the loud speakers and the clinician observes whether overt behavioral

responses to the stimuli occurred. Response behaviors of neonates and infants up to 4 months of age include eye-widening, eye-blink, arousal from sleep, a shudder of the body and observable definite movement of the arms, legs, or body (Northern and Downs, 1984). The best responses are obtained when the infant is in a light stage of sleep in which there is eye or body movement when the eyelid is flicked (Mencher, 1972).

Low functioning children such as visually handicapped children may be unable to respond to a sound by performing a required task. Therefore, unconditioned responses must be relied upon. Noise makers are often employed to elicit unconditioned responses to sound. Although the acoustic spectrum of noise makers is broad and their intensity is likely to vary, they help to obtain an initial estimate of hearing sensitivity (Hodgson, 1978). Noisy toys might include squeeze toys, bells, drums, rattles, clickers and so forth. By varying the intensity and position of the noise makers hearing level can be determined. Often children will give behavioral cues such as slowly moving a hand toward the earphone through which the sound is coming or perhaps tilting the head toward the shoulder on that side. Sometimes a smile or sudden body movement will indicate that the sound is perceived.

The usefulness of this type of assessment depends largely upon the expertise of the examiner and his powers of observation. If used correctly, it can be an extremely important diagnostic tool.(O' Neill and Oyer 1966).

CONDITONED RESPONSE TESTS:

In conditioned-response or play audiometry, the child is taught to perform a task in response to a sound. O' Neill, Oyer and Hills (1961), suggest that a period of semi-structured play is vital to the success of play audiometery. During the play period the clinician (i) establishes a rapport with the child, (ii) observes his reactions to gross sounds to get an idea of the level of response; (iii) establishes the idea of responding to sound in a play audiometery setting and (iv) selects procedures and responses suitable to the child's abilities.

Hodgson (1978) suggested that the key to the procedure was "astute observation of the child's behavior and appropriate reaction by the examiner".

The particular method of response chosen should depend upon the individual child and the clinician must be flexible enough to discard a method that does not appear to interest the child in favour

of an activity that will hold his attention. The important point is to make this a kind of game for the child and make it a pleasant experience for him. A primary reward, such as a small piece of desirable food, given after each appropriate response, can help facilitate learning of task in many cases.

Tangible Reinforcement Operant Conditioning Audiometry:

Llyod, Spradlin, and Reid (1968) described a technique for mentally retarded children that can be applied to the deaf-blind also. They suggested positive reinforcement (candy, creal) for appropriate response and a mild punishment (time-out) for inappropriate responses. The child is taught to respond by pushing a button on a feeder box when he hears the sound, and then a food reinforcement is given. Other responses such as stacking rings on a pole or dropping blocks in a box can also be used. In most instances, a hand-raising response is not sufficient to hold the child's interest long enough to obtain pure-tone thresholds (Kent, 1981).

Visual Reinforcement Audiometry:

Another technique that has proved useful is "visual reinforcement audiometery" with visually impaired children who have some light perception (Liden and Kankkunen, 1969). In this procedure lighted transparent toys are flashed on when a signal is

presented during the conditioning period. When the test is begun, the light is flashed immediately following a response.

A less elaborate method, also employing light, is to pair a beam from a penlight, which is shown directly into eyes, with an auditory stimulus, and then gradually to remove the light reinforcement. Calvert et al. (1972) reported that light was a stronger reinforcer than food for some deaf-blind children. Tait (1977) confirmed that visual reinforcement proved to be surprisingly effective in obtaining reliable test results.

The examiner may have available to him all kinds of gadgets and techniques to work with deaf-blind children and need not be limited to the few techniques mentioned. Ultimately, however, he/she must learn to work with these children and to be a careful observer of subtle behavior changes that occur as a result of auditory stimulation (O' Neill and Oyer, 1966). Above all, he/she must remember that the simplest method that will get the desired results is usually the best method (Hodgson, 1978).

Conditioning to Tactiie Stimuli:

Throne (1962), suggested a procedure which uses tactile stimulation, via the bone conduction receiver, to condition **a** child. The vibrations at 250 and 500 Hz can easily be felt and once a response to the tactile stimulation is established, conditioning to sounds can then be attempted. Behavioral observations to gross sounds of loud intensity may also help the clinician decide of further attempts at conditioning will be fruitful (Kent, 1981).

Localization Test:

A localization responses of an older blind-deaf individual can be tested using the procedures suggested by Bergman. The client is seated in the centre of the test room, surrounded by eight loud speakers set at 45 degrees angle from the clients position. The subject is told that he would hear a sound at any point around him, and is instructed to turn bodily toward the sound, facing it as directly as he can. The test signal used is white noise activated in the control room by the audiologist and delivered to each of the eight loud speakers in a random order. As the client turns, the metal head band, placed over the clients head and attached to an overhead self-synchronous motor, causes a remote motor in the control console facing the audiologist in the adjoining room to turn exactly as the client turns his head. Two exposures are presented

from each loud speakers in a random order, for a total of 16 exposures and a record is kept of the correct responses. The test is performed at SPL of 48 dB. If this low level results in slow or absent responses by the client, the test level is raised. The test is repeated with hearing aids, with the presentation level at 48 dB SPL.

Fusion Test:

Two identical signals were presented through two loud speakers, one at 45° to the left to the point 5 feet in front of the subject, the other at 45° to the right of the same point. At a low-test level, the stimulating sound is perceived as emanating from the point directly in front of the listener if his hearing is "balanced", although equal sensitivity is not required. If 'balance' is absent, the stimulating signal is perceived as coming from one or the other loudspeaker. Fusion tests were routinely performed at a level of 45 dB reference audiometric zero.

Where blindness exists, hearing becomes the primary perceptive faculty, the primary channel of communication, and the primary source of physical orientation and perspective, and therefore it takes on such significance and importance as to require attention beyond that of the population without visual impairment. So the use of binaural hearing aids, when possible and testing for

localization and fusion become important in auditory rehabilitation of the hearing impaired blind persons.

SPEECH TESTS:

It is often impossible to use traditional speech tests to obtain a level of speech understanding and/or discrimination ,as deaf-blind children usually lack the language to respond to such tests or repeat words.Depending upon the child's visual ability and his language functioning, pictures can be substituted to obtain some level of speech understanding. Pictures can be used only if the child has some minimal vision. If and when pictures are used, it may be necessary to display only two at a time to avoid exposing the child to too many stimuli and thereby distracting him.

At times, the only response to speech that can be obtained is a threshold of awareness and this can be accomplished in much the same way as pure-tone conditioning. The child simply carries over the task to speech stimuli and responds when he detects speech in the same way as when other sounds were used. The speech awareness threshold is considered as reliable as the threshold for understanding speech in most cases and is usually 8 to 10 dB better than the threshold for understanding (Hodgson, 1978).

Words are presented at a comfortably loud level and when possible a standard list such as the phonetically balanced Kinder garten words are used. When they cannot be used, simple commands such as "stand up", "touch your nose" , etc. are used to get an estimate of speech understanding. When a deaf-blind child evidences no understanding for speech, it is important to determine what auditory distinctions can be made in order to know where to being auditory training, which hearing aid is suitable and whether the child is making progress in auditory skills (Sheeley, 1979).

Again, the audiologist must be creative in presenting pairs of sounds and two-alternative responses. Pairs of sounds may include a low-pitched and high-pitched voice, a loud and soft voice, a long and a short utterance etc., Two bright coloured blocks can be placed in front of the child. Bright coloured blocks are used in case the child is partially sighted. The large block will be associated with a low-pitched voice and small block will be associated with a high-pitched voice. The child is taught to indicate the large object when he hears the low-pitched sound and so on. It is usually by practice that he child performs successfully (Kent, 1981).

OBJECTIVE TESTS:

Many audiologist believe that behavioral audiometery alone is insufficient to evaluate the infant and multi-handicapped child. They follow the cross-check principle (Jerger and Hayes, 1976). This principle states that the audiologist will check the results of a single test (observation of overt behaviors) with an independent measure (Immitance audiometery, electrocochleography or auditory brain stem response audiometry).

Objective techniques such as crib-o-gram can be used, which records an infant's movement before and after sound are presented. This test is used to determine whether a child passed or failed a hearing screening. Other measures include frequency following responses (Berlin 1978) heart rate (Mulac and Gerber 1977) respiration rate (Gilchrist 1977) and reflex relation index (Norris, Stelmachowicz and Taylor 1974).

IMMITANCE AUDIOMETRY:

Immitance findings are so valuable that the measurements are included by many audiologist in the standard hearing evaluation for both children and adults. The procedures requires only passive cooperation. The individual must allow an ear tip to be placed in the ear canal and often a head phone to be placed over the opposite

ear. A parent or assistant may be needed to hold the child on the lap while providing a distracting item with which the child may play, such as a set of keys or a squeeze toy (Kent, 1981).

If a child shows a great deal of resistance to the head piece, the same procedure can be used as with earphones. Once the head piece is in place, the clinician may have to wait before inserting the probe tip. After the probe tip is placed in the canal, it may be necessary to let the child get used to its feel before securing it to obtain a seal. In few cases immitance is elicited by asking the child's physician to give a mild sedative (Kent, 1981).

Northern and Down (1978) list many techniques to be used to distract children under 3 years for the minute or two required to make immitance measures. Some procedures likely to be useful with deaf-blind children are:

(i) gently brush the back of the child or am with a cotton swab, using exaggerated movements.

(ii) Make a pendulum from a bright, unusually shaped object and swing it slowly in short exclusions (a hand-held penlight might also be moved in slow rhythmic motion)

(iii) Stick bits of tape to various parts of the child's or examiners anatomy and encourage the child to pull them off (may not-work if this is a new activity for the child) and;

(iv) Slowly and methodically unlace and lace the child's 9hoe.

EVOKED RESPONSE AUDIOMETRY (ERA)

In auditory brain stem response audiometry the electrical activity from the brain stem is picked up during the first one hundred of a second after the sound. An electrode is placed on the scalp at the crown of the head and the child can, but need not be sedated (Berlin, 1978).

When Auditory Brainstem Response (ABR) audiometry testing is performed to estimate hearing status, click stimuli are presented at different intensity levels to determine the lowest level which elicits dectable responses. When the ABR is used to estimate the hearing status of children it is not essential that all major component waves (I, III and V) be identifiable. It is necessary only to determine that the test stimulus elicited a detectable responses and then measure the absolute latency (the time interval from stimulus onset

to the point of peak amplitude) of a dominant ABR component wave. In latency measurements, wave V is routinely used because it is consistently the most robust and stable component of the ABR. As stimulus intensity is decreased, wave V is usually the last wave to disappear. ABR testing of young children is, thus, directed toward determining the response threshold for each ear and comparing the resulting ABR latencies with appropriate clinic norms. This focus on detecting responses at low stimulus intensity levels has resulted in test protocols which differ significantly form those used to detect a retro cochlear lesion. Typical test parameters for testing children are shown in Table 4.

TABLE 4: Typical ABR Test Parameters for Estimating the Hearing Status of Infants:

STIMULUS	**ALTERNATING POLARITY CLICKS**
Stimulated Rate	33.3/sec
Number of Stimuli averaged	2000
Intensity level	Varied to determine ABR threshold
Filter Settings	100-3000 Hz
Amplification	x100,000
Analysis time	10-15 millisecs

(Weber 1994)

The test findings do not given a pure-tone audiogram, and further more, they do not tell about hearing for low-frequency sounds. The test results do give information about each of the major auditory nuclei in the brain stem (Berlin, 1978).

As no involvement of the visual abilities of the child is required, it can be done in the same way as done in children with vision. Sedation may have to be administered to those children who are uncooperative to undergo the test.

OTO ACOUSTIC EMISSION (OAE):

As with BSERA, OAE also does not require a child to use the visual mechanism. Hence, the procedure does not differ if the child has a visual problem.

Oto acoustic emissions (OAES) are sounds generated within the normal cochlea, either spontaneously or in response to acoustic stimulation. The first measurements of OAE's were reported in 1978 by David Kemp.

Types of OAE

There are two basic OAE phenomena :

1. Spontaneous Oto acoustic emissions (SOAEs) and
2. Evoked Oto acoustic Emissions (EOAEs)

There are several subclasses of EOAEs based primarily on the stimuli used to evoke them. These include i) transient evoked oto acoustic emissions; (ii) acoustic distortion product emissions; and iii) stimulus frequency emissions.

Spontaneous Oto acoustic Emissions:

Spontaneous Oto acoustic emissions occur in the absence external stimulation, where as evoked oto acoustic emissions occur during or after external acoustic stimulation. Spontaneous oto acoustic emissions (SOAEs) are more or less continuous narrow band signals emitted by about 50% of human ears even in the absence of external acoustic stimulation (Norton et al. 1994).

A probe containing a sensitive, low-noise microphone is placed in the external ear canal. The shape of the probe is similar to those used in immittance testing, and immittance tips are frequently adopted for use in measuring OAEs. The probe does not have to be hermetically sealed in the ear canal, but a good fit is desirable to eliminate as much external noise as possible from entering the external ear canal. The subject should be seated quietly in a comfortable reclining chair with good head and neck support. The output of the microphone is generally led to a preamplifier and high-pass filter. It is usually necessary to filter out body noise and

external noise below 300-400Hz. The output of the preamplifier or filter is then subjected to frequency domain analysis (i.e. a Fast Fourier Transform or FFT) by using either a dedicated spectrum analyzer or FFT software and a computer (Norton et al. 1994).

Transient Evoked oto Acoustic Emissions:

Transient evoked oto acoustic emissions (TOAEs) also referred to as click evoked OAEs (COAEs) are frequency dispensive response following a brief acoustic stimulus, such as a click or tone burst. TOAEs are obtained by using synchronous time-domain averaging techniques similar to those used to measure auditory evoked potentials. In addition to a sensitive low-noise minature microphone, as used for measuring SOAES, the probe contains a miniature sound source for delivering the stimulus. Responses to several stimuli (e.g. 500-2000) are averaged to improve the signal to-noise ratio. The ear canal sound pressure is amplified by a factor of 100-10,000 and high-pass filtered at 300-400 Hz. It is then digitized at a rate of 40-50 KHz (Norton et al 1994).

Distortion Products oto acoustic Emission:

Acoustic distortion products (ADPs) result from the interaction of two simultaneously presented puretones (the primovies). In human the most prominent destruction product is the cubic

difference ton. Specifically, if two tones of frequencies F1 and F2 (F2 > F1) are presented externally, a third tone of frequency $2F1-F_2$ will be produced internally. Best response can be obtained if F1/F2 = 1.2

The eliciting tones are presented to the ear through a probe microphone assembly similar to those used in measuring other types of emissions except that there are two stimulus delivery ports (Norton et al. 1994).

Distractors, similar to those used by Northern and Downs (1978) to carry out immitance audiometry, can be used during the OAE test procedure.

INTERPRETING / REPORTING TEST RESULTS

Following the collection of audiological test data, test results must be complied, interpreted and reported and appropriate recommendations must be made. Concise information about the extent of the hearing loss must be included, as well as procedures used to arrive at these results. If the child was seen for several sessions, this should be commented upon and the extent of conditioning required and how it was achieved should be stated (Kent, 1981).

Audiological assessment of deaf-blind children is perhaps one of the most difficult and challenging tasks on audiolgoist faces. Conditioning a deaf-blind child to respond to sounds can be exhaustive and time consuming. but it is well worth the effort if valid data can be obtained Behavioral tests can be easily cross-checked using objective test such as immitance audiometery, BSERA and OAE. When all the information has been obtained the audiologist, should recommend appropriate rehabilitative measures (Kent, 1981).

HEARING AIDS FOR THE DEAF-BLIND

The patient who has no usable vision or an extensive peripheral field loss requires auditory cues not only for conversation but for orientation and travelling purposes as well. Hearing aids must provide this patient both with the ability to understand and with adequate localization skills in order to compensate for inadequate vision (Karp, 1989).

It is the responsibility of the audiologist to determine a child's hearing abilities, and to consider amplification whenever a hearing loss is found. For hearing aid selection, speech sjpres are usually compared using various aids, as well as the potential users subjective opinions about each aid. The extent of the loss will also affect aid selection. For obvious reasons, it is usually impossible to choose a hearing aid for a deaf-blind child in this manner.

How does one go about choosing the appropriate aid (or aids) for a deaf-blind child?

In cases in which conditioning has been achieved with some degree of success, comparison of responses to warbled pure tones or speech in sound field can give the clinician an idea of the relative

benefit from different aids. The child's behavior and responsiveness to amplification can also be assistance. Does he smile when an aid is on? Does he pull at the aid and show discomfort, suggesting that an aid is too strong? Does he show no overt change in behavior at all? In addition, factors such as other handicapping conditions (mental retardation) must be considered, as well as the presence of self abusive and/or self stimulatory behaviors that would make the child a poor hearing aid candidate. Therefore, it can be seen that when faced with the problem of fitting a deaf-blind child with amplification, the audiologist has many factors to consider, and the task not an easy one (Kent, 1981).

Perhaps , the best course open to the audiologist is, after all factors have been considered, to fit the child with trial amplification and observe his performance in the classroom and his behavior with and without amplification keen observation is necessary, because in some cases benefit may not be readily apparent. Input from the teacher and other persons who have daily contact with the child is essential. A period of trail amplification will certainly not harm the child and will greatly assist the audiologist in making a final decision.

One last factor to be considered is whether to fit one aid or two. Northern and Downs, 1978 suggest that the deaf-blind child should be fit with true binaural amplification (two separate units), as two sided hearing is necessary for adequate mobility.

This, of course, requires microphone placement at the ear and necessitates binaural hearing aid fittings for bilateral hearing loss. If the hearing loss is unilateral or symmetrical, localization skills may be harder to achieve. CROS aids may then be considered (Karp, 1989). This should away be considered but every child must be considered individually.

Fitting parameters (i.e. gain, output frequency emphasis, and ear mold style) are no different for that population than for those with normal vision Post-auricular or In-The-Ear aids are the styles of choice. Some severely hearing impaired patients may require a body aid or auditory trainer for conversation and classroom use, but these should be used only indoors since the microphone placement may impair localization skills needed for travel. In order to select the proper amplification for mobility purposes, hearing aids must be tested in real life circumstances as well as in a sound-treated testing chamber. Whether this will be in a quiet suburban street or a noisy city street will depend on where the individual patient travels

with the aids. Eye glass hearing aids are not usually the style of choice since many visually handicapped people use different optical devices for different visual tasks. It is impractical for more than one pair of eye glasses to house the needed hearing aids. It is important to know if a patient uses low vision aids, such as special lenses or magnifiers to see fine detail, since these devices should be utilized during hearing aid management training (Karp, 1989).

Because of the masking effects of wind and rainy, many visually impaired patients prefer not using either hearing aids out-doors. This problem can be partially resolved with a wind screen over the microphone (Karp, 1989).

The dually handicapped persons often uses audition to determine distance from a danger signal. Such need necessitates the reduction of compression amplification. The bus that is five feet away should not be made to sound like the car 50 feet away (Karp, 1989).

People with severe visual impairments which affect independent travel, need low frequency as well as high frequency information. It is not advisable to amplify only high frequencies for speech discrimination. Hearing aids with wide-band frequency

response and external tone controls should be considered. The patient can be taught to set the tone control depending on the auditory need at that moment. Microphone type is also an important issue with this population. Uni-directional microphones are recommended for conversational settings, but travelling requires an omnidirectional type. For this reason, it is advisable to fit the hearing aids with dual microphone settings which the patient can manipulate depending on the listening situations (Karp, 1989).

The blind patient needs to rely on tactile cues rather than vision to master hearing aid management. Many patients with peripheral field defects, however have adequate central acuity and can be taught to handle their aids by visual means. For those who cannot, plastic models of ears can be useful in teaching how to insert a hearing aid into the ear. Battery insertion and manipulation of external controls can be taught using enlarged drawings made with felt tipped pens or through tactile cues alone (Karp, 1989).

Thus it can be noted that while selecting hearing aids for the deaf-blind, suitable modifications in the conventional techniques may be required. As far as possible binaural hearing aids should be prescribed modifications while counselling regarding hearing-aid use should also be made.

COMMUNICATION METHODS

FOR TRAINING THE DEAF-BLIND

There are various communication methods for training the deaf-blind. The choice an approach would vary from individual to individual depending upon the time of onset of the deafness and blindness, age of the child, and other physiological factors.

The time of onset of deafness and/or blindness will make an enormous difference in the ability of the client to communicate. It will also make a difference as to his familiarity with usual methods of receiving messages. If the client has had hearing during his early years and youth, his understanding of speech will still be strong through memory. If on the other hand his deafness is congenital or came on at a very early age so that he has no memory of speech or hearing and if in addition, he has been educated as a seeing deaf child, gradually signs replace words. With the loss of sight and the necessity of introducing manual methods of communication into his palm, words too, lose so much of their significant as to require the use of the most elementary vocabulary (Babu et al. 1972).

A feasible starting point to rehabilitate the deaf-blind would be to use those well established methods of teaching the blind and

methods of teaching the deaf. A single handicap exerts its effect upon the educational process in a far different manner than do dual handicaps. With a dual sensory handicap, the modalities remaining are few and are neurologically different in their responses to stimulation (Walsh, 1981).

The deaf-blind can be taught to communicate either using speech or the manual form of communication.

1. Oral Communication Methods

   a) **Speech:** This is the faculty of uttering articulated sounds or words to express thoughts (Webster'9 1961). In its phonetic aspect, breath and voice are molded to form words. The chief purpose of speech is to convey ideas to the minds of those who hear it (Haycock, 1970).

   Where speech is possible, it is, of course, extremely effective for communication. Unimpaired speech is very high on the independence, openness, portability and speed dimensions. It is one of the most powerful symbol system. For individuals with disabilities, the usefulness of speech usually first degrades along the dimension of intelligibility or understandability by the general public.

Even after the speech is totally unintelligible to the general public, it is often still functional with persons familiar with the disabled individuals (Blackstone, 1986).

The next area to degrade is generally the openness of the system. Persons familiar with disabled individuals are generally capable of understanding their speech, but often cannot do so if they do not have some preconceived notion of the topic of communication or discussion and the specific words that will probably be used. For these individuals, speech may be very effective for expressing basic needs and common communications with those familiars with them. Another dimension that is often affected is the speed of communication. However, because even impaired speech is generally so much faster than other augmentative modes, speech, when possible, is usually the communication method of choice (Blackstone, 1986).

b) **Tadoma Method:** The origin of the Tadoma method was by a Norwegian teacher named Hofgaard and latter this method was reintroduced by Sophia Alcorn, (1932), who had two deaf-blind students named Tad Chapman and

Oma Simpson after whom the method was named. In this method, the sense of touch is used for receptive language. The student puts his or hand on the face of the person with whom he or she is talking. The thumb covers the mouth and feels the movements of the lips, jaw, and tongue. The other fingers are spread over the check and jaw to pickup the vibrations. (Guldager, 1969).

In the Tadoma method of communication, deaf-blind individuals receive speech by placing a hand on the face and neck of the talker and monitoring actions associated with speech production. Pervious research has documented the speech perception, speech production and linguistic abilities of highly experienced users of Tadoma method.

Reed et al. 1982, studied the performance on identifying consonant and vowel stimuli through the Tadoma method of speech reading with a deaf-blind, experienced uses of the method. For a set of twenty-four consonants in CV syllables, the average performance of the subject was 55%. For a set of fifteen vowels and diphthong in CVC syllables, performance averaged 56%. Confusion

matrices derived form the identification tests were analyzed for performance on a set of articulatory/phonological features. The results of the features analysis for consonants indicted that the features voicing, lip rounding, frication and place were well-perceived. For vowels, the features lip rounding, tenseness and vertical lip separation were well-perceived.

To gain further insight into the cues involved in the perception of speech segments through Tadoma Reed et al. (1989) conducted a study small-set segment identification experiments were conducted in which the subjects access to various types of articulatory information was systematically varied by imposing limitations on the contact of the hand with the face. Results obtained on three deaf-blrind, highly experience users of Tadoma were examined in terms of percent-correct scores, information transfer and reception of speech features for each of sixteen experimental conditions. The experimental conditions were categorized as: (i) One-cue conditions (ii) Two-cue conditions (iii) Three-cue conditions, (iv) Full-hand

conditions. These four conditions were further categorized as follows to comprise the sixteen experimental conditions:

(i)	**One-cue conditions:**	Breath (B) Lip Movements (L) Jaw Movements (J) Vibration on Neck (N)
(ii)	**Two-cue Conditions:**	Breath, Lip Movements Breath, Jaw Movements Breath, Vibration on Neck Lip Movements, Jaw Movements Lip Movements, Vibration on Neck Jaw Movements, Vibration on Neck
(iii)	**Three-cue conditions:**	Breath, Lip Movements, Jaw Movements Breath, Jaw Movements, Vibration on Neck Lip Movements, Jaw Movements, Vibration on Neck Breath, Lip Movements, Vibration on Neck

(iv) Full-hand conditions : Normal Tadoma

Whispered speech

The percent-correct scores and the information transfer in bit for each subject under each of sixteen experimental conditions were provided for both consonants and vowels. The amount of information available on each consonant feature (voicing, manner, and place) is one bit. The amount of information available on the vowel features is roughly one bit for the features round, tense, back and low and 1.4 bits for the features high. The maximum amount of information in each of the eight item stimulus sets is three bits.

For both stimulus sets, percent-correct scores, which were similar across the three subjects, increased uniformly with the number of cues provided by the hand placement. The normal Tadoma score, which averaged roughly 90% correct on both stimulus sets, was some what higher than the average three-cue score.

For consonants, information transfer for the one-cue conditions averaged 1.2 bits and ranged from 1.0 bit for Breath (B) alone to 1.4 bits for Lip Movements (L) alone. For the two-cue conditions information transfer averaged roughly 1.7 bits and ranged

from 1.4 bits for Breath, Vibration on Neck (B,N) to 2.0 bits for Lip Movements, Vibration on Neck (L,N). For three-cue conditions, information transfer averaged roughly 2.2 bits compared to 2.6 bits obtained with the normal Tadoma hand position. For vowels, a somewhat larger degree of variation was observed among the one-cue conditions than was seen for consonants. Performance for Breath (B) along (0.7 bits) and Lip Movements (L) alone (1.1 bits) was lower than for Vibration on Neck (N) alone (1.6 bits) and Jaw Movements (J) alone (1.4 bits). For the two-cue conditions, information transfer averaged 1.6 bits and ranged from 1.2 for Breath, Lip Movements (B, L) to 1.8 bits for Lip Movements, Vibration on Neck (L,N). For the three-cue conditions, information transfer averaged roughly 2.1 bits compared to 2.5 bits for normal Tadoma. It was generally consistent with expectations based on the speech cues assumed to be available in various hand positions.

Reed et al (1992) reported a summary of speech reception performance of experienced Tadoma users is given in Table 5. The speech reception results obtained through Tadoma, particularly for the reception of connected speech, represent the highest levels of performance reported to date through the tactual sense alone. Tadoma users, for example, were able to receive 50-85% of keywords rates in CID sentences at slow-to-normal speaking rates and could track connected speech at rates of 30-40 words/min. Such levels of performance through the tactual sense alone have not yet been achieved through artificial tactual devices. Nonetheless,

performance through Tadoma is not perfect and most likely does not represent the ultimate capabilities of the tactual sense for speech communication. Obviously, there is significant room for improvement on the tactual reception of speech through Tadoma, with respect to the identification of isolated speech segments as well as the comprehension of connected speech.

TABLE 5: Summary of Speech - Reception performance of Experienced Tadoma Users

[1] **Description of Test**	**Test Materials**	**Procedural Notes**	**Sub-jects**	**Performance Range**
Consonant identification	24 consonants in c/a/ syllables	1-Interval, 24 alternative forced choice	**9**	52-69% correct
Vowel Identification	16 vowels in /h/ -v-/d/ syllables	1-inerval, 16 alternative forced choice	**9**	18-60% correct
W-22 words	200 monosyllabic words	Open-set recognition of isolated words	**9**	26-56% correct
SPIN sentences (Kalikow, Stevens and Elliott 1977)	Sentences with high or low predictability words	Open-set recognition of final word in sentences	**9**	Hp words: 24-86% correct LP words: 20-54% correct
CID sentences (Davis and Silverman, 1970)	Everyday, conversational sentences	Open-set recognition of key words in sentences	**8**	48-85% correct
Harvard Sentences (IEEE, 1969)	Phonemically balanced sentences	Open-set recognition of key words in sentences	**3**	45-60% correct
Training (De Fillipo and Scott, 1978)	Connected discourse	Verbatim repetition of text	**3**	30-40 words / mm

MANUAL COMMUNICATION METHODS:

a) Gestures:

These are motions of the body or limbs intended to express an idea or a passion or to enforce or emphasize an argument, assertion or opinion (Websters, 1961). Guldager, 1969 suggested that words have meaning for normal children in terms of the movement, which they convey or call forth. Language must also encompass movement for the deaf-blind child. However, if the conditions are congenital, natural gestures must be taught. These gestures are perceived by the deaf-blind through tactual reception.

In general, while gestures can be understood by individuals with similar experiences and cultural backgrounds, they are not universally understood. Although gestures do not have linguistic constraints in their formation and usage, they do have cultural constraints (Balckstone, 1986).

b) Finger Spelling:

In this method, the letters A to Z are formed in certain fixed positions of the fingers of one hand (Silverman and Lane, 1970). Although finger spelling is an exact and effective means of communication, it is the least efficient form of

manual communication as each letter of each word must be produced (Hipskind, 1989).

A deaf-blind individual needs to make direct contact with the sender to understand the message. The specific typo of contact made varies depending on the preference of the receiver. Some deaf-blind individuals prefer to have the sender make primary contact with the palm, while others wrap their fingers and palm around the side and back of the sender's hand (Summers, 1992).

Reed et al. (1990) studied the reception of finger spelling by the deaf-blind. This is a method of communication frequently used among members of the deaf-blind community. In their study, the hand of the deaf-blind individual was placed on the hand of the sender to monitor the hand shapes and movements associated with the letters of the manual alphabet. The purpose of their study was to examine the ability of experienced deaf-blind subjects to receive finger spelled materials, including sentences and connected text, through the tactual sense. A parallel study of the reception of finger spelling through the visual sense was also conducted using deaf subjects who used signs.

The subjects used to study the tactual reception of finger spelling included 5 deaf-blind individuals who were highly experienced in the tactual reception of the American one-hand Manual Alphabet. Two of the subjects relied on finger spelling as their primary means of communication; the other 3 were primarily Tadoma user's who relied to varying degrees on finger-spelling as an alternate means of communication. Their experience using finger spelling ranges from 10 to 40 years.

To evaluate the visual reception of speech six deaf adults participated in the study. Four subjects had sustained their hearing losses prelingually. All the subjects were highly experienced in both reception and production of the American one-hand Manual Alphabet and had used this method of communication for a minimum of 55 years.

For both visual and tactual reception of finger spelled sentences, accuracy of reception was examined as a function of rate of presentation. In the tactual study, where rates were limited to those that could be produced naturally by an experienced interpreter, highly accurate reception of conversational sentence materials was observed throughout the range of naturally produced rates i.e. (2 to 6

letters/second). In the visual study, rates in excess of those that can be produced naturally were achieved through variable-speed playback of videotapes of finger spelled sentences. The results indicated the performance varies systematically as a function of rate of presentation, with scores of 50% correct on conversational sentences obtained at rates of 12 to 16 letters/sec (rates roughly double to triple normal speed). Thus, it suggested that normal communication rates for the visual reception of finger spelling are restricted by limitations on the rate of manual production. From Reed et al's. (1990) study it can be construed that the tactile mode of receiving finger spelling is less efficient when compared to the visual mode.. Rates of communication through natural production of finger spelling (for both tactual and visual reception) are slow compared with normal speaking rates. A fast finger spelling rate of 6-7 letters per second corresponds to roughly 2 syllables per second. Such a rate of communication, while slow compared with normal speech, requires the production of a new letter once every 140-170ms and taxes the ability of the hand to produce the necessary complex changes in configuration. The development of artificial devices for the production of finger spelling may offer

solutions for increasing communication rates (Gilden and Jaffe, 1987; Kramer and Leifer, 1988).

c) Signs:

This is a system of conventional gestures of the hand and arms that by and large are suggestive of the shape, form or thought which they represent (Silverman and Lane 1970). Recent research has found that significant information is also conveyed by the entire upper portions of the body. In general, one movement represents one word. Sign language may be received through residual vision or by placing the deaf-blind person's hands on those of the communicator. Some educators consider the movements generally too large to be effectively transmitted by tactile modality (Guldager 1969). Sign language frequently is used by persons deaf from early childhood, who lost their vision later in life (Dinsmore, 1953).

Delhorn et al. (1988) studied the tactual reception of sign language with a group of ten deaf-blind teenagers and adults, roughly half of whom used American Sign Language and half Pidgin Sign English. For isolated signs, correct repetition was 73-96% across the subjects. Typically, incorrect responses arose from misperception of one of the four major cues (i.e. hand shape,

movement, location and orientation of the palm) define a sign; (For example, the two-handed signs 'make' and 'work' (which were confused with each other) are nearly identical in their hand shape, movement, and location, but differ in the orientation of the palm). The production rates of the interpreters were roughly 0.75 - 2.6 signs per second. Correct reception of key signs in conversational sentences was 65-90% across subjects and was relatively independent of rate of production.

Bellugi and Fischer (1972) have shown that although the basic rate for sign is roughly half of that for speaking (2.4 signs per second compared with 5 syllables per second), fewer signs than syllables are necessary to communicate a given message. In fact, the rate at which simple conceptual units (or propositions) are produced is roughly equivalent for both sign and speech. The normal rates of communication for both sign and speech is approximately 0.8 conceptual units per second.

Comparison Across Tadoma, Finger Spelling and Sign Language:

Reed et al. (1990) Studied a comparison of accuracy-rate functions for Tadoma and for the tactual reception of finger spelling

and sign language was obtained by using data under each method for the reception of conversational CID sentences (Davis and Silverman, 1970) accuracy of reception can be examined as a function of rate of communication across the three methods. Accuracy of reception is expressed in terms of the percentage correct reception of keywords (for Tadoma and Finger spelling) or key sings (for sign language), while communication rate is expressed in terms of proposition per second (Bellugi and Fischer, 1972).

Finger spelling yields the highest accuracy of reception, but is accomplished at the slowest rate (0.1-0.3 propositions per second). Normal-to-fast finger spelling rates (5-6 letters per second) correspond to proposition rates roughly one-third method of normal speaking rates. Communication rates for Tadoma and tactual sign reception are higher than for finger spelling, with some sacrifice in accuracy of reception. For both Tadoma and sign language, reception scores were roughly 60-90% correct for rates in the range 0.2-0.55 propositions per second, which is nearly three-quarters of normal speaking rate. The highest proposition rates (0.7-1.1 propositions per second) were obtained through the Tadoma method, but performance though Tadoma dropped at rates above roughly 0.5 propositions per second.

The three methods can be compared only across small range of rates (i.e. 0.2-0.3 propositions per second) due to in availability of data across other rates. Performance for three methods appears to be comparable across this small range (Summers, 1992).

Cross Code:

This is a signal system that was developed by a deaf-blind man to communicate with this family. It is based on the position of the signals on the back of the hand. The system can be easily transferred to any part of the body (Dinsmore, 1953).

Braille Hand Speech:

Invented by Louis Braille in 1829, Braille is characterized by raised dots (Jensema, 1982). This tactile system was invented for use with individuals who are blind. Characters in Braille are formed by raised dot patterns based on a six-location cell. This technique is used to help deaf-blind individuals to read printed material (Musselwhite, 1988).

In Braille hand speech, the deaf-blind persons holds the index, middle and ring fingers of both hands in such a position that the tips of the fingers represent the six dots of the Braille cell. It is

especially useful for people who are blind from early childhood and subsequently lost their hearing (Dinsmore 1953).

WRITTEN COMMUNICATION METHODS:

a. ***Standard Print of Type:***

This is written communication method. It can be rendered on lined or unlined paper. A person's ability to lead this size print indicates good corrected vision or normal vision in a limited visual field.

b. Large Print or Type:

This is written communication rendered on lines or sometimes heavily lined paper, approximately the size of primary type. Large print is usually used by individuals with limited vision that is not sufficiently had to warrant use of Braille (Jensema, 1982).

c. ***Braille:***

A Braille writer is **a** manually operated, six-key machine which, as its name indicates, types Braille. The slate and Stylus, used to take notes, is easily carried in a pocket or on a clipboard. The slate is a metal frame with openings through

which Braille dots are embossed with the aid of a pointed stylus. For teaching Braille, three "grades" have been developed.

Grade 1 Braille consists of Braille cell configurations for each letter of the alphabet, while Grade 2 and Grade 3 use additional contractions and codes to reduced the number of cells necessary to spell out a word or sentences (Vanderheiden and Lloyd 1986).

Braille readers use a form of Braille in which words are shortened and contractions are made that speed up the reading and writing of Braille. At best, the reading rate for Braille is much slower than visual reading and the math symbols cumbersome. Children who are blind begin to learn Braille in kindergarten by manipulating peg boards and other materials to develop pre reading skills (Mullins, 1979).

In the first grade the children learn to use Braille writers, which are similar to a type writer, but with just six keys to emboss the Braille character. Older children use stylus and Braille form to take notes in class (Mullins, 1979).

Braille Code in India:

The Indian expert Braille Committee has worked out a common Braille code for all Indian languages, known as Bharati Braille, in accordance with the recommendations made by the U N E S C O. The most outstanding characteristics of Bharati Braille is its conformity with Braille codes of neighboring countries such as Sri Lanka and Malaysia (Mehta, 1983).

Devices used for Producing / Reading Braille:

Some electronic device can scan written material or receive direct communication from an individual and transfer it into Braille units for a deaf-blind persons (Jensema, 1992).

Devices used for Producing Braille:

a. Tele touch: An interesting device using the Braille symbol system and used to communicate with deaf-blind individuals, is called the tele touch. The sighted speaker uses an ordinary type writer, in which the letters are converted to Braille letters which appear as pins raised on a small plastic disc

and read by the deaf-blind listener's index finger (Mullins 1979).

b. Braille through Computers: Casey (1981) in Gallaudet college described a computer programme that can be utilized for producing Braille. Gallaudet has a continued need for Braille output for students who are both hearing-impaired and visually impaired. The Braille production system now being used at Gallaudet is a commercial product called the Duxbury Braille Translation System. The program processes computer text and converts the text into Grade II Braille Codes. These special codes drive a Braille embossing machine which produces the embossed paper output. The mini computer is connected to a large computer. The data entry of the text that will be Brailled or embossed for the student is done on the larger computer which has terminals scattered all over the campus. Students do the data entry as a part-time basis whenever it is more convenient. When the data entry is finished, it is transmitted to the mini computer which does the conversion from

computer text into the proper Grade-Ill Braille codes to control the embosses. The embosser is connected directly to the mini-computer. The embossing hardware accepts data at 120 character a second .Typically, 100 pages of Braille can be embossed in about 25 minutes

Devices used for Reading Braille:

Optacon: A promising new electronic device to allow tactile reading of visual symbols is the optacon. Reading is done by the index finger. Shapes of letters, numbers and patterns are formed by 144 pins, which can be raised on a small surface. The blind person scans the visual material by means of a small camera about the size of a large fountain pen. It has been very successfully used by some blind persons, who have for the first time been able to read their own personal letters, the daily newspapers, or Job application. (Mullins, 1979)

d. Palm Writing:

This is a method of communication generally used with people who have lost their vision after learning to read. It simply means that the communicator uses his/her index finger to draw the letters of the alphabet in the palm of the deaf-blind person to spell out messages (Jensema, 1982).

e. *Glove Method:*

A thin white or tan glove that fits the deaf-blind person's hand is inscribed with the letters of the alphabet on the palm and the numbers 1-10 on the back of the fingers. The letters of the alphabet are located on the tips of the fingers, the joints and the palm of the hand at the base of the fingers, while the numerals appear on the finger nails and the knuckles. The communicator touches the letters and numbers that convey the message, much in the same way one would touch a typewriter (Jensema, 1982).

DEVICES FOR THE DEAF-BLIND:

Communication Boards and Electronic Assists:

Communication board is a term used to describe any prosthetic device composed of displays of objects, symbols, pictures, or words that enables non vocal, expressively disabled,

and often severely physically limited people to relate information. Existing communications boards can be divided into three categories according to how the non-vocal, severely handicapped individual operates them: scanning, encoding and direct selection. Factors such as degree of muscular control and intelligence are involved in the process of matching an aid to an individual (Jensema, 1982).

Direct Selection Aids:

These aids offer the greatest possible number of responses because the child can point directly to the word or character he/she wishes to communicate. Electronic direct selection aids are available that print out the items the child has chosen. These device require the greatest among of physical control.

Communication words can be operated by pointing or by electronic assists. Control mechanisms for electronic boards can be operated via touch, breathing or biting, depending on the user's capabilities. Output can be noted through typed recording, light signals, or audible alarms. One recently developed device produces an electronically synthesized voice in response to touch on a sensitive key-board programmed with up to 991 phonemes and morphemes the uses can create a virtually unlimited. English-language vocabulary by combing basic component sounds. Such a

device would the appropriate only for a deaf-blind persons who had a good command of English language vocabulary (Jensema, 1982).

Auditory-Spatial Sensory:

Leslie Kay invented the ultrasonic special sensor aid which transmits ultrasonic pulses through a wide beam (60°) and sense the reflections from objects by 2 receivers spaced a small distance apart. These receivers translate the reflections into audible signals, which are fed to each ear through small speakers. The inter aural amplitude difference serves as the cue for object position on the horizontal plane. Object distance is coded as a change in frequency (high/far and low/near), object size is coded in terms of intensity, and shape and texture are coded by signals timbre (Goldstein and Wiener, 1981). Bower has asserted that intrasensory perceptual coordination is present at birth, or shortly thereafter, and doesnt require learning. In its extreme form, his theory predicts that very young infants experience "perfect intrasensory substitutability" (Bower, 1978 and Bower, 1977) claimed that one infant who wore an ultrasonic spatial sensor had "no problem using it to explore his environment when he was 4 months old. Bower reported that his infant subject, immediately upon hearing these signals from the aid, defended himself from looming objects, reached accurately for non threatening objects, and exhibited social responses as the mother

moved in and out of the aids field of operation. Bower reported that the infant become even more proficient with experience; by 8 months of age he searched for and found objects that disappeared behind screens./

Such a performance by a blind baby is surprising given that normal 4 months-old are just beginning to orient their heads again toward invisible sounds, and their responses to sounds in space off the horizontal plane are, at best inaccurate and hand to elicit. Furthermore, blind infants tend to be delayed in almost every motor mile stones, including those that do not depend exclusively on vision, such as reaching for sounds (Fraiberg 1974). Fraiberg (1977) reported that blind infants, following specific training, began to reach towards sounding objects at 8 to 10 months of age. This device will be useful for deaf-blind children who have residual hearing.

THEORITICAL MODELS FOR EDUCATING THE DEAF BLIND:

There are 3 prominent theoretical models that have relevance to the field of deaf-blind education. Two theories are based on normal development and one is unique in that it emerged from work with deaf-blind children.

1. Piagetian model

2. Behavioristic model

3. Van Dijk model (Walsh, 1981).

1. Piagetian Model or Influences:

Within the field of special education, the Piagetian model has become quite popular as it offers special educators a niche for special children without the need to resort to the use of labeling. Within this model most deaf-blind students fall into the sensory-motor stage of development, the first stage is piaget's learning theory. The basic problem with categorizing deaf-blind children into this development model is that the theory concerns itself with the ways in which the child acts on his environment, receives feedback and internalizes these experiences.

A deaf-blind child, because of the lack of vision and hearing, is not attracted to his enviornment and will not explore unless prompted and led. This characteristics behavior indicates the extreme importance of beginning work with the deaf-blind as quickly after birth as possible.

With the deaf-blind child, work must commence at the stage of sensation, continue toward perception, and then move to cognition when possible. In the beginning stage of instructions the major emphasis must be placed on overcoming the lack of motivation through holding, cuddling and talking (for vibration extension) and through he provision of objects placed within easy reach of the infant. If the objects remain the same over a long period of time, the infant can learn to recognize then by touch and in this way begins to move from sensational stage into a meaningful relationship with his environment.

Many deaf-blind infants at the beginning of the process will ignore even objects in close proximity and refuse to react to them. It is imperative at this stage of development that the child be slowly led to touch, hold and manipulate **(Walsh, 1981).**

2. The Behavior Analysis Approach:

Another popular approach to the teaching of **deaf-blind** children is that of behavioral analysis and modification. This behavioristic model appears to currently be the best approach

to dealing with the problems of varying degrees of sensory loss and the individual educational needs of deaf-blind students.

Operant conditioning through the U9e of reinforcement procedure is a powerful and effective process with deaf-blind children. Physical and or/tactual process reinforcement is precisely what is required for modifying behavior in deaf-blind children as the sense of touch is often the only major sense left for input. Food rewards can also be effective, as the sense of taste and smell are usually intact and as most deaf-blind children remain at the oral stage for longer periods of time than "sensory-complete" children. To be effective the teacher has to restyle her approach until the child become receptive to tactual reinforcement (Walsh, 1981).

3. The Van Dijk Method:

The third model that has found favor with teachers and workers with the deaf-blind is that of Van Dijk and this staff at St. Michielgestal in the Netherlands. Van Dijks theory has arisen from his actual work with the deaf-blind population, and his approach to their education in the most complete with

regard to understanding how deafness and blindness can impede development and learning. He indicates several crucial points in the development of a deaf-blind child as follows:

1. The deaf-blind child does not readily develop an ago. "There is not an ego that takes a stand towards the world, it is at the mercy of the world". In order to allow for the development of an ego, he suggests the unity between the child and his parents must be maintained for a longer period of time thus affording extensive nurturance for the child.

2. He further states that the development of the senses is something very complicated that the sense do not develop singly and if one part in the sensory development is not functioning, there is complete disorder. It would follow that the more portions of the sensory equipment that are not functioning the more disorder.

Van Dijk and his staff advocate as the first step toward learning for the deaf-blind child the release

of the child from isolation of his body. They begin their work and through the teaching of body knowledge and motor development. "By starting to walk, jump and creep the child begins to disengage himself from things" (Walsh , 1981).

Many educators disagree with Van Dijk's methods, but it must be recognized that he has studied, observed, and worked with deaf-blind students over a long period of time. He has attempted to understand their minds and bodies and how sensory deprivation has affected their functioning. Perhaps the most controversial aspect of his theory is his belief that many deaf-blind children respond only at the brainstem level and often information never reaches the higher levels of the brain. There are, however, many responses that everyone makes at the brainstem level. Thus, it may not be as limiting as it might first appear. There is the possibility of stimulation and even communication, although on a very low level (Walsh 1981).

Therapy as the first stage In Education:

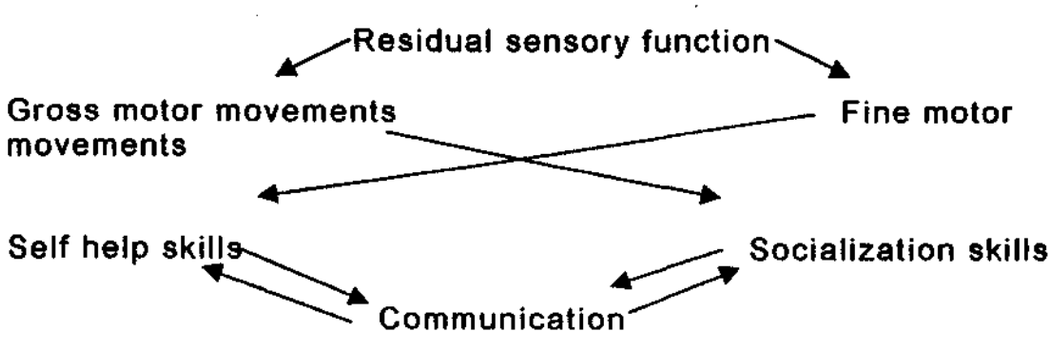
(To teach motor skills, social and communication skills)

The major problem in establishing therapeutic goals stems from the current inadequacy of assessment of function. Accurate assessment of children with multiple disabilities is extremely difficult in the first eighteen months of life (Murphy et al. 1980).

The task of early education is to create purposeful sensory motor activity in both the gross and fine motor areas where the children display an abundance of spontaneous but often undirected activity, however, the creation of purposive motor activities alone is not the total answer.

Murphy et al. (1980) established a early educational model for the teaching of meaningful motor patterns which will form the basic necessary skills for everyday life and communication (Figure 1)

Figure 1: An Educational Model Based On The Creation And Exploitation Of Meaningful Motor Patterns.



The model based first stage graded progress chart, to assess the five areas mentioned is the above model. Such a chart is to identify and record the child's initial function and then to select realistic goals for future training. As the gross motor and fine motor areas form the base of the model, They have to elaborated on. This allows the therapist to isolate the initial assets of the child and then to select realistic goals for the future. For example; a child may be able to roll from front to back, but not from back to front. Therefore, "rolling from back to front" is likely to be this child's immediate future goal in the gross motor area.

The chart allows the therapist to record all gross loco-motor function and to categorize it as constructive or unconstructive behavior. The point to emphasize at this stage is that all gross motor function should be recorded. When constructive Vs unconstructive classifications are made, it is easy to determine those patterns of behavioral which require encouragement and those which are unproductive and hence to be discouraged.

Fine motor functions are assessed and recorded in a similar manner. At the most primitive level, the manipulative skills of the hands allow the child to explore his environment for its sensory

qualities. For example: The child may pick-up an object to smell, tap mouth, look at or feel. The processing of such sensory motor inputs will eventually lead not only to his discrimination of these sensory inputs, but will be extended to the beginnings of concept development. Therefore, such aspects are included at the end of the fine motor chart.

As indicated by the model presented in Figure 1, motor movements are necessary for the development of self-help skills. For example: For a child to drink from a container, he must be able to grasp it using Palmar grasp and then lift it to his mouth by bending his elbow. At a much more sophisticated level, he can use a pincer action to finger feed. Similarly, all self-help skills can be viewed as constructive. Use of fine and/or gross-motor movements. The main areas assessed here are drinking and feeding. All areas have three columns for recording purposes; this allows us to indicate whether the child only completes the skill with help; whether he attempts it alone, or whether he completes it unaided.

The socialization skill is divided into 2 areas : self concept and environmental interaction. The socialization skills that are involved here promote interaction by their very nature. Therefore, this areas is critical to communication.

As indicated in the Figure 1 self-help and socialization skills promote the development of communication. The necessary prerequisites listed in the communication chart stress this fact. However, as communication develops, it also enhances the acquisition of skills in the self-help and socialization areas. The communication charts are designed for pre-syntactical behavior.

To score the children's assets on the charts, a tick is placed in the appropriate box. As with any form of continuing assessment, goals should be regularly reviewed, care being taken to observe and record any information with regard to the educational progress, which may refine the diagnostic information from the medical model (Murphy et al. 1980).

Dual handicaps makes management difficult since few education authorities have enough cases to justify provision of a specialist unit (Hall et al. 1984). The overriding aim is to show parents how to build up a sense of social security in their children by enabling them to share in family life, with ordinary spoken language as the common medium for communication and thought (Ewing, 1957).

VOCATIONAL PROGRAM FOR THE DEAF-BLIND

Work is essential for every human being, not only for the sake of money to obtain economic independence but also because it contributes to self esteem and self dignity leading to an abiding joy for life. For persons with disability, it is still more important as it boosts the self esteem and financial gain generated out of it offset to a great extent the negative impact of society disdainful attitude. Experience has shown that efforts to bring out the best of the latent talent in a person with disability and to over come disability have led to their not only securing a gainful and respectable place in society, but also excelling in various and diverse areas of human endeavuor. It is obvious that efforts towards vocational rehabilitation is a must. This is so not only for the individuals point of view but also because the benefit to the society as a whole is immense in economic items. Instead of making them consumers of charity and revenue, they can and should be made tax payers. Besides the loss of emoluments, status and the sense of fulfillment to a non-employed disabled, the cost to the society is also colossal in terms of missing the benefits of the latent talent and in terms of contribution that is made by family, relatives and friends and disability pensions and relief by the government (Panday and Advani, 1995).

The general conference of the International Labor Organization in 1955 defined vocational rehabilitation as : "That part of the continuos and coordinated process of rehabilitation which involves the provisions of those coordinated services, e.g. vocational guidance, vocational training and selective placement, designed to enable a disabled person to secure and retain suitable employment (Panday and Advani, 1995).

INVOLVEMENTMENT OF REHABILITATION AGENCY PERSONNEL:

There are many ways that personnel from rehabilitation agencies can contribute to career preparation for multi handicapped students while they are still enrolled in educational programs. People who previously may have been excluded from rehabilitation services due to the severity of their disabilities are how eligible and in some cases are given priority consideration (Simpson, 1981).

School personnel and parents should initiate a referral to the appropriate rehabilitation agency on behalf of the student when he/she is fourteen or sixteen years of age. The content of this referral letter and the type of services being requested will very depending on the students', family's, and school's needs. Basic summary information describing the student should include available

medical data (including opthalmological and audiological reports), psychological data, educational reports, mobility reports, prevocational summaries, and relevant social history data. Services being requested can vary; however, they need to be related to long-range vocational goals in some way (Simpson, 1981).

PREVOCATIONAL TRAINING OF THE DEAF - BLIND:

Prevocational training serves the purpose of providing exploratory and earning activities in the vocational adjustment area which may assist the client to discover his capacities and to strengthen his readiness for more specific vocational training and placement (Rusalem, 1959).

Why do deaf-blind clients require prevocational training ?

In the first place, not all deaf-blind clients do require these services. Those with successful recent work histories, having retaining useful vision, may need vocational training and or vocational placement. Through diagnostic interviews and a study of the work history, the counselor may ascertain that work habits, attitudes, dexterity, self-care activities and interpersonal relationships, meet the levels required in industry or workshops. Under such circumstances, the phase of prevocational training may be 'skipped', There is less agreement about the client who lacks

these attributes, but who is planning to enter one of the professions or clerical work. Some hold that the typical prevocational training program is inappropriate to this group because so many of the activities are industrial in nature. Others maintain that the specific industrial nature of the activities is not relevant. That is, if the client needs the experiences provided through prevocational training, even if some of these activities seem remote from his ultimate vocational objective, an industrially oriented prevocational program can be effective. Holders of this position feel that a deaf-blind man planning to establish his own business whose work habits and attitudes are in need of remedial work, will gain that he needs from a program which has as its base, tools and machines (Rusalem, 1959).

It is true, clients prefer a prevocational training that seems related to activities to their vocational goal. If the prevocational goals can be achieved through activities related to the client's occupational choice, the client's interest and motivation seem to be accelerated.

Mithaug (1978) has written several articles that focus on developing prevocational/personal adjustment programs for severely and profoundly handicapped young adults. He believes that:

The procedures considered critical to the development of a successful program included:

1. Surveying potential placement opportunities in the community
2. Selecting probably placements that are appropriate for a given client
3. Assessing the job requisites for entry into that setting.
4. Assessing the clients skill competencies and deficiencies with respect to those entry level requirements
5. Developing training objectives that focus upon reducing identifical deficits.
6. Selecting training tasks (curricula) that will develop needed skills.
7. Identifying instructional tactics that will facilitate skill acquisition.
8. Identifying behavior management strategies to reduce and eliminate behavior incompatible with work.
9. Developing a measurement system that accurately reflects progress towards these objectives, and
10. Developing and specifying decision rules for concluding about day to day, week to week, and month to month progress towards the objectives.

VARIABLES TO CONSIDER:

In initially establishing a prevocational / personal adjustment services program, the following factors need to be considered :

1. Characteristics of the student / client population
   a. Age
   b. Cognitive developmental level
   c. Affective developmental level
   d. Psychomotor development level
   e. Documented abilities and disabilities
   f. Previous training and educational services
   g. Involvement of natural or surrogate family
2. Characteristics of the school and / or habilitation / rehabilitation centre
   a. Level of staff skills and interest
   b. Time and number of staff available
   c. Amount of physical space available
   d. Amount of funds available
   e. Interest and support administrative personnel
3. Characteristics of the Community
   a. availability and range of habilitation / rehabilitation services and facilities
   b. interest level of local and state habilitation / rehabilitation services personnel

c. availability of transportation, recreation, mental heath, medical and housing services

d. existence of advocacy and consumer organization

Prevocational services may be provided by determining the age of each student. It should noted as to the type of activities his/her non-disabled peers are involved in at that age. For example, if the student is six or seven years of age, it would be appropriate to be teaching him/her to be responsible for some tasks related to room maintenance, clothing care, and food preparation. It would be inappropriate to have a student of this age involved in a work shop or work-study setting.

The cognitive development level of a student needs to be. assessed prior to determining the long term prevocational / career goals as well as short-term objectives. This information is vital when the program emphasis is being considered and will be a major determinant of time allocated to specific prevocational / career experience (Simpson, 1981).

The concepts of prevocational training is not always clearly seen by deaf-blind client as, indeed it is not always clearly seen by others. Rusalem (1959) interviewed a group of deaf-blind clients

who had had prevocational training during the ten years previous to the research interview. It was found that few had recollection of the prevocational experience and fewer were able to separate it form their vocational training. The tendency was to club all training together in retrospect and to refer to it as vocational training. In fact, in working with the clients, it frequently requires long counseling periods to interpret the purpose of prevocational training to the deaf-blind client. Even after such intensive counseling effort, a number of deaf-blind clients fail to gain a full understanding of this phase of the total rehabilitation process. It is difficult to estimate how much of this difficulty emanates from the deaf-blind persons limited capacity to deal with a concept as abstract as this and how much is due to his motivation to get on with the business of earning a living with the least possible for training. In any event, it seems that prevocational training must be accompanied by continuing counseling relationships on an individual basis.

PRE VOCATIONAL TRAINING CONTENT:

A number of activities are useful in the curriculum of prevocational training for the deaf-blind. Among these are:

1. Physical orientation to the pre-vocational training centre - a planned program of introduction to the physical setting and to the social climate of the program.

When a deaf blind person enters prevocational training, sufficient staff should be allotted at the time of admission to plan and execute a professional orientation program. It is not sufficient to assign a capable client or helper to show the deaf-blind client through the pre-vocational centre. It requires skill to develop an early relationship with the deaf-blind person and to use this relationship to give the client a sense of security in the situation.

The orientation to the prevocational centre is not only in terms of physical facilities, but also in terms of regulations, procedures, privileges and limitations. Often these form the content early counseling experiences. However, it should be understood that it is not only a matter of communicating the nature of these facts about the center to the client, but also a problem of helping him to accept them and use them constructively in his rehabilitation. This is another argument for placing the orientation process in the hands of a skilled workers who can handle client feelings, assist in the

clarification of the clients relation to center procedures and help in working through problems in meeting center standards of behavior. In many cases, the orientation period can be crucial. When planned carefully and when carried out by trained workers, its chances of success seem enhanced (Rusalem 1950).

2. Physical Conditioning :

Some deaf-blind persons may lack the physical readiness for the demanding prevocational program. Assuming medical approval of full day work activity and certification by the physician of the clients physical capacity to take part is such activity, the client may be enrolled in a program of physical reconditioning. Ideally, this would be supervised by a physical or corrective therapist or physical educator, but if this is not practicable a staff member of the centre may perform this function, provided he has had some work in physical education techniques. Physical reconditioning is not a field for amateurs, but is an area of skill which demands training and experience on a level with all the other specialties on the rehabilitation team. Physical reconditioning may often valves in addition to an extension of work tolerance. It may assist in the achievement of the deaf-blind person of an improved

sense of balance and a keener sense of body position in relation to the environment. It may also give him a sense of confidence and a greater freedom of movement in space.

3. Self-care Activities:

Seeing or blind; hearing or deaf, the individuals living in a culture is expect to met certain standards of personal hygiene, dress, appearance and manner do not come naturally to then they are learned.

The evaluation of daily living activities has long been essential part of the procedure used to evaluate orthopedically handicapped persons; the evaluator uses somewhat different pattern for the blind.

The self-care activities that deaf-blind need to be trained include the following: Personal hygiene, Personal grooming, Table deportment, Manner and common daily activities. After the clients present level of functioning has been determined and a check list has been prepared, prevocational training may then provide, opportunities for mastering the essential life activity in which the client is deficient. These appear to be best taught individually

4. Domestic Science

During the early stages of the prevocational training a check list evaluating the capacity of the client in the kitchen and housekeeping activities should be prepared. With proper training a deaf-blind person can engage in most of the essential activities. These include:

1. House cleaning
2. Preparation of Foods
3. Shopping
4. Sewing buttons and other activities involved in the maintenance of clothing
5. Laundry work - washing, drying and ironing
6. House had decoration and furniture arrangement
7. Establishment of house hold routines
8. Using common household appliances.

This type of evaluation is as important for deaf-blind men as for deaf-blind women. It assists the deaf-blind persons to the reestablish his role in the family. Through participating in these activities, he may regain a useful hole in the home. A simple step in the direction of \holding up his end of house hold activity may give impacts to a change in attitudes on the part of the family. It may also help the client in a small way to

being to see his own potentialities for useful constructive activity.

5. Home Repair:

The deaf-blind person, living alone or with others, is often required to make adjustments in the home environment which meet emergencies or forestall the development of an emergency. The repair of leaking tap, the tightening of a screw in an appliance, the repair of a frayed electrical cord, the maintenance of wooden furniture and even the changing of a tire may not only be useful to the deaf-blind person himself, but it may enable him to be of service to others.

Skill in home repair can serve to encourage the integration of a deaf-blind person into his family. It can also function to give him independence in living by himself. As such, it is a valuable phase of prevocational training.

Communication Skill

Too frequently, no organized effort is made to equip the deaf-blind person with more efficient methods of communication. This is often due to inadequate knowledge in respect to adequate communication

systems. There are drawbacks to almost every method with which we are currently familiar. Training in any system of communication which places the deaf-blind individual in a position to communication freely with hearing persons has vocational significance.

It seems apparent that such a planned curriculum in communication would be a valuable adjunct to any prevocational training program. If properly organized along sound educational lines and incorporated into the prevocational training program. On a scheduled basis, the work in communication skills may have a better chance of success.

Other communication skills have a part to play in the prevocational program. Speech therapy, when indicated, may be planned in conjunction with other prevocational activities. When it is indicated, Braille instruction may be incorporated into the schedule. Some deaf-blind persons make intensive use of Braille in reading - a few do so in writing.

Instruction in handwriting can be a valuable communication course for the deaf-blind person. Many daily financial transactions in all society require the minimum of a personal signature. In some case, the signature of a deaf-blind person may have deteriorated and more require some additional work to make it move legible. In a few cases, the deaf-blind client may have not learned handwriting before. In this case, instruction may provide him with the minimum skill to sign letters and checks.

6. Socialization Activities :

The prevocational training period may serve as an excellent real-life laboratory in which to observe client responses to varying degrees of social interaction Situations may be relatively instructured and informal such as at meals, rest periods and at the beginning and of the work day. In these situations clients spontaneous social behavior is noted in a relatively free social atmosphere. These observations may indicate a need for further counseling or help in social skills.

From time to time, it may become apparent to the prevocational staff that the client needs specialization services

beyond those available at the center. At such times, referrals may be made to the agency group and recreation staff, if any. In the absence of a group work and vocational program in the community which is specially keyed to the needs of the blind or the deaf, the staff may have them to other community resources for consultation and guidance. (Rusalem 1959).

Vocational Training for the Deaf-Blind:

Specific pre-service vocational training is infrequently offered to deaf-blind clients; at least in terms of a planned course of training. Since most deaf-blind persons move into low-skilled manual jobs, which require little pre-employmont vocational training; the training that is offered is performed right on the job. In preparing for professional, clerical or skilled manual jobs, the deaf-blind person will receive his training at a source where non-handicapped persons receive similar types of training. Thus, the deaf-blind persons preparing to enter the field of writing and editing would learn his craft in the school, college or apprenticeship considered necessary and desirable for entrance into this field. The deaf-blind person who is planning a career in Braided proofreading would receive his training at a school or library in which such training is ordinarily offered.

However, in the low-skilled jobs in industry and workshops, such preliminary training is not generally required. The deaf-blind person after completing his prevocational training is ready for a variety of manual jobs, which can be cleared in the job setting within a few hours, days or weeks. Consequently such of the vocational training of the deaf-blind takes place right on the job itself (Rusalem, 1959).

Role of Voluntary Organizations:

Under the Government of India scheme of assistance to voluntary organizations, assistance to the extent of 90 percent is available for providing training and placement services to the handicapped. Several such organizations have been assisted under the scheme and a number of handicapped persons have been provided with training and placement. These organizations however, are located in major urban centers. Rural areas have been altogether ignored. Some of these organizations do look after the rural population in the periphery of the urban centres where they happen to be located, but the rural population, by and large, has been

ignored. The services of some of these organizations along with cost-effectiveness and quality can serve as examples for expanding the network of vocational training organizations (Pandey and Advani, 1995).

FACILITIES / CONCESSIONS AVALIABLE TO THE DEAF AND BLIND IN INDIA

WELFARE MEASURES FOR THE DEAF AND BLIND:

The government of India, Ministry of Welfare has published concessions/ facilities to the disabled for various states/union territories (1994).

The concessions available throughout the country for the following:

Reservation in Government Jobs: In grade 'C and 'D' posts under the government reservation re provided in direct recruitment for physically handicapped persons.

Category of Handicapped	**Percentage of reservation**
(i) Visually handicapped	1%
(ii) Hearing handicapped	1%

Scholarship / stipend:

The state governments award scholarship to the disabled children's from class I to Class VIII.

In addition the other welfare for the handicapped include disability pension, unemployment allowance, conveyance allowance, bus concession/travel concession, assistance for self employment, tax exemption and assistive devices. Other facilities include financial assistance for medical treatment, free tape recorders for blind students, free Braille to blind students, residential schools for the visually handicapped and hearing impaired, sanction of reimbursement tuition fees and financial assistance to law graduates.

The welfare measures available for the disabled varies from state to state. No mentioned has given regarding the facilities that a person may if they have dual handicaps. However, it may be constructed that a deaf blind individual may avail the concession according to the severity of each the disabilities. If the blindness is more severe than deafness, than he/she may avail the concession /facilities for blindness. If deafness is more severe than blindness, then he/she may avail the concessions/facilities for deafness. On other hand both deafness and blindness are equally severe then they may avail concessions for both disorders.

Rehabilitation Centers for the Deaf-Blind in India:

95% of all we learn comes through our eyes and ears. Thus, deaf-blindness causes unique problems in communication, mobility and accessing information.

For the young child who is deaf-blind, the world is initially much narrower. If the child is profoundly deaf and totally blind, his or her experience of the world extends only as far as the fingertips can reach. Such children are effectively alone if no one is touching them. Their concepts of the world depend upon what or whom they have had an opportunity to physically contact.

As far as the developing world is concerned, there are not enough resources to provide health care and education for everyone. Disabled people, especially people who are deaf blind, may have little access to these services because lack of awareness. In many countries, there has been little research, although we can assume that there are large numbers of deaf-blind people.

In India, there is no research or survey conducted regarding the population of persons with deaf-blindness but the community based rehabilitation projects have hinted that there might be around 2,50,000 persons with dual sensory/mutli-sensory losses.

Though deaf-blindness present many unique challenges to both those who have visual and hearing impairments and to their families and friends, these challenges are by no means unsulmaountable. Many persons who are deaf-blind have achieved a quality of life that is excellent.

Institutions of Rehabilitation Centres:

A few centers have been established in India, which cater to the educational and vocational training to the deaf-blind. The majority of these centers are set-up in urban areas. The facilities available in a few of these centers are briefly discussed.

Helen Keller Institute - Mumbai:

Established in 1976, the Helen Keller institute for the deaf and deaf-blind is a pioneering institute in India that creates, builds and develops services to allow the disabled person to become a contributory functional and accepted fellow human being within his own society. Individualized education is provided to the children* currently the school has 23 children. This institute provides free/subsidized education, transport facilities, nutrition, hearing aids and medical facilities. They also provide uniform counseling services for children, teachers and parents. Apart from these

facilities they also incorporate pre-vocational, vocational and co-curricular activities.

Pre-Vocational Programme:

The early intervention program includes infant-toddler to pre-schoolars. This program is conducted 6-15 hours a week. Apart from this, the staff also visit homes of the local students once a month to impart family orientation. They also provided graded functional / academic curriculum leading to pre-vocational training and vocational rehabilitation.

Vocational Rehabilitation:

The students who under go vocational rehabilitation are given training in making office envelopes, candles, liquid soaps and jewellery (i.e. necklaces, ear-rings, bracelets) with artificial beads and semi-precious stones.

Co-curricular Activities:

The co-curricular activities include swimming, camping, mobility and domestic science, mime, dance etc.

Hostel facilities are provided for those children residing outside Mumbai and the method of education followed is individualized education program.

Clarke School for the Deaf : Chennai:

The Clarke school was founded in 1970 for children who are deaf and mentally retarded. It is one of the few successful schools in the country imparting high standard of education to hearing impaired and mentally retarded children. This school has a separate unit for the blind (Sadhana) started recently. 20 children receive education from Clarke school. Integrated Educational Programme (IEP) is planned for all the children. Children's of different age groups are enrolled in the school. The children are given communication training via tactile stimulation, audio-visual stimulation. Training is given for the following: activities for daily living skills, peer group interactions, mobility training, Braille reading, Braille creating, fingers spelling, sign language for the deaf-blind, communication board, alphabet board etc. This training is done to enhance the communication skills of the children. Apart from this Behavior Modification procedure is used to control the unwanted behavior like eye poking, light gazing etc.

Auditory training and improving vision is carried out through audio-visual stimulation. It is utilized only for a few students.

Low vision tests and visual acuity are measured for the children's. Special devices for magnification like magnifying glasses are used by children's who have vision at 3 meters.

National Blindman's Association - Ahmedabad:

The blind people's Association (formerly known as "Blind Men's Association) is a registered trust working for the past 40 years for the comprehensive rehabilitation of persons with blindness, deafness, mental retardation, locomotor disabilities and multiple disabilities. They have initiated community based rehabilitation programmes for the disabled people in villages. They do admit deaf-blind children however the details of services offered to these special group is not available.

In many special schools there are children with multiple disabilities and these schools get help from the above-mentioned centers through postal tutions.

Professional Development Programme:

To increase the knowledge and skills in a specialist are relating to sensory impairment and additional disabilities. Sense international, UK offers a Professional Development Programme (PDP) for professional from all over the world to increase their skills.

This is a specialized program, structured and designed specifically for individual participant that gives opportunity to observe classroom, daily care and educational activities of deaf blind children and adults in educational and residential settings in UK for a period of six weeks.

There are schools in India that have separate facilities within one-campus for the hearing impaired and for the visually impaired. The training for the two different handicaps are dealt with separately. Examples of such schools are:

i. Little Flower Convent for the Deaf and Blind, Chennai

ii. School for the Deaf and Blind, Mysore.

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